



KRT1 gene

keratin 1

Normal Function

The *KRT1* gene provides instructions for making a protein called keratin 1. Keratins are a group of tough, fibrous proteins that form the structural framework of cells called keratinocytes that make up the skin, hair, and nails. Keratin 1 is produced in keratinocytes in the outer layer of the skin (the epidermis), including the skin on the palms of the hands and soles of the feet.

The keratin 1 protein partners with another keratin protein, either keratin 9 or keratin 10, to form molecules called keratin intermediate filaments. These filaments assemble into strong networks that provide strength and resiliency to the skin and protect it from being damaged by friction and other everyday physical stresses.

Health Conditions Related to Genetic Changes

epidermolytic hyperkeratosis

Dozens of mutations in the *KRT1* gene have been found in people with epidermolytic hyperkeratosis. This condition is a skin disorder characterized by red, blistering skin at an early age and thick skin (hyperkeratosis) later in life. People with *KRT1* gene mutations typically have PS-type epidermolytic hyperkeratosis, which features thick skin on the palms of the hands and soles of the feet (palmoplantar hyperkeratosis) in addition to other parts of the body.

Most *KRT1* gene mutations associated with epidermolytic hyperkeratosis change a single protein building block (amino acid) in the keratin 1 protein. These amino acid changes commonly occur in regions of the protein that play a role in intermediate filament formation. The mutations alter the keratin 1 protein and seem to affect how intermediate filaments interact with each other to form networks. The altered proteins still form intermediate filaments, but the intermediate filament networks are weaker and do not function normally. Without a strong network, skin cells become fragile and are easily damaged, which can lead to blistering in response to friction or mild trauma. It is unclear how these mutations cause the overgrowth of keratinocytes that results in hyperkeratotic skin.

other disorders

KRT1 gene mutations are involved in many other skin disorders. In several of these conditions, there is palmoplantar hyperkeratosis, but the skin on other parts of the body is usually not affected. A condition called epidermolytic palmoplantar

keratoderma caused by *KRT1* gene mutations is relatively mild. Affected individuals typically have palmoplantar hyperkeratosis with detachment or loosening of the epidermis (epidermolysis), usually seen as blistering. People with nonepidermolytic palmoplantar keratoderma have palmoplantar hyperkeratosis with no evidence of epidermolysis. In striate palmoplantar keratoderma type 3, the skin thickening on the palms and soles follows a specific pattern.

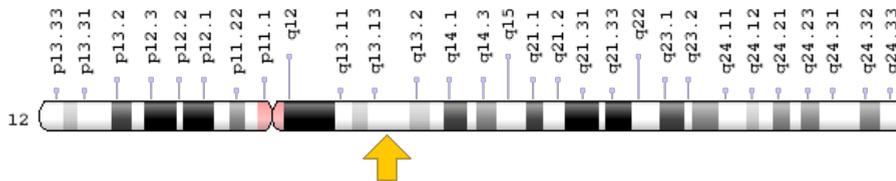
KRT1 gene mutations are also responsible for a skin disorder called Curth-Macklin ichthyosis hystrix. This condition involves severe hyperkeratosis on the palms and soles and sometimes the skin over large joints or on the torso. This condition is distinguished by specific changes in the keratinocytes.

Another skin condition caused by genetic changes in the *KRT1* gene called cyclic ichthyosis with epidermolytic hyperkeratosis is similar to epidermolytic hyperkeratosis, but the skin changes disappear for short periods, then recur. The recurrent skin changes can last for weeks or months.

Chromosomal Location

Cytogenetic Location: 12q13.13, which is the long (q) arm of chromosome 12 at position 13.13

Molecular Location: base pairs 52,674,736 to 52,680,407 on chromosome 12 (Homo sapiens Annotation Release 108, GRCh38.p7) (NCBI)



Credit: Genome Decoration Page/NCBI

Other Names for This Gene

- 67 kDa cytokeratin
- CK-1
- CK1
- cytokeratin 1
- cytokeratin-1
- EHK1
- hair alpha protein

- K1
- K2C1_HUMAN
- keratin 1, type II
- keratin, type II cytoskeletal 1
- KRT1A
- type-II keratin Kb1

Additional Information & Resources

Educational Resources

- Human Intermediate Filament Database
http://www.interfil.org/details.php?id=NM_006121
- Molecular Cell Biology (4th Edition, 2000): Intermediate Filaments
<https://www.ncbi.nlm.nih.gov/books/NBK21560/>

Scientific Articles on PubMed

- PubMed
<https://www.ncbi.nlm.nih.gov/pubmed?term=%28%28KRT1%5BTIAB%5D%29+OR+%28keratin+1%5BTIAB%5D%29%29+AND+%28%28Genes%5BMH%5D%29+OR+%28Genetic+Phenomena%5BMH%5D%29%29+AND+english%5Bla%5D+AND+human%5Bmh%5D+AND+%22last+1800+days%22%5Bdp%5D>

OMIM

- ICHTHYOSIS HYSTRIX, CURTH-MACKLIN TYPE
<http://omim.org/entry/146590>
- ICHTHYOSIS, CYCLIC, WITH EPIDERMOLYTIC HYPERKERATOSIS
<http://omim.org/entry/607602>
- KERATIN 1, TYPE II
<http://omim.org/entry/139350>
- KERATOSIS PALMOPLANTARIS STRIATA III
<http://omim.org/entry/607654>
- PALMOPLANTAR KERATODERMA, EPIDERMOLYTIC
<http://omim.org/entry/144200>
- PALMOPLANTAR KERATODERMA, NONEPIDERMOLYTIC
<http://omim.org/entry/600962>

Research Resources

- Atlas of Genetics and Cytogenetics in Oncology and Haematology
http://atlasgeneticsoncology.org/Genes/GC_KRT1.html
- ClinVar
<https://www.ncbi.nlm.nih.gov/clinvar?term=KRT1%5Bgene%5D>
- HGNC Gene Family: Keratins, type II
<http://www.genenames.org/cgi-bin/genefamilies/set/609>
- HGNC Gene Symbol Report
http://www.genenames.org/cgi-bin/gene_symbol_report?q=data/hgnc_data.php&hgnc_id=6412
- NCBI Gene
<https://www.ncbi.nlm.nih.gov/gene/3848>
- UniProt
<http://www.uniprot.org/uniprot/P04264>

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